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## Pointing Device with Integrated Audio Input

### ~~Technical Field of the Invention~~

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The present invention relates generally to input devices and in particular the present invention relates to pointer type input devices used with touch sensitive processing devices.

### ~~Background of the Invention~~

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Advancements in processing power have enabled the design and manufacture of processing devices which deviate from a traditional input device such as a keyboard. For example, hardware and software have been developed which allow a user to control a computer using normal speech. The user is also capable of dictating information to be  
15 stored in memory provided with the computer. Presently, however, accurate speech input must be provided to allow the processor to accurately translate the speech into computer readable data. As such, it is desired to locate a microphone close to the user such that background noise is minimized. Present systems, therefore, require that the user wear a headset to position the microphone close to the user's mouth. The  
20 processing power required to perform speech recognition, combined with the requirement for high-quality speech input, dictates that a user operate a traditional stationary personal computer.

Mobile personal computing devices, such as lap-top computers and personal digital assistant (PDA) devices, are available with touch screens as input devices.

25 These touch screens allow a user to touch locations on the display screen to indicate desired input. This type of input allows manufacturers to simplify the interface between the user and the processor, while still providing flexibility to adapt to changes in software executed by the processor.

For the reasons stated above, and for other reasons stated below which will  
30 become apparent to those skilled in the art upon reading and understanding the present

specification, there is a need in the art for a mobile personal computing device which allows a user to enter information using both a touch screen and voice commands.

### Summary of the Invention

5 A computer input stylus comprising a housing having a first end and an opposite second end, a microphone located at the second end for receiving voice signals, a transmitter located in the housing for transmitting the voice signals received by the microphone to an external device, and a switch circuit for activating the transmitter.

In another embodiment, a personal digital assistant (PDA) system comprises a  
10 mobile personal digital assistant having a touch screen display for producing input signals in response to physical contact, and an input stylus. The stylus comprises a housing having a first end and an opposite second end, a microphone located at the second end for receiving voice signals, a transmitter located in the housing for transmitting the voice signals received by the microphone to the mobile personal digital  
15 assistant, and a switch circuit for activating the transmitter.

A method of inputting data to a personal digital assistant (PDA) is described in another embodiment. The method comprises receiving input voice signals with a microphone located in a hand-held stylus, transmitting the input voice signals from the hand-held stylus to the personal digital assistant, and translating the received input  
20 voice signals into computer readable data and storing the computer readable data in the personal digital assistant.

### Brief Description of the Drawings

Figure 1 is illustrates a personal computing device having a touch screen;

Figure 2 illustrates a pointing device for use with the personal computing device

of Figure 1;

Figure 3 is a block diagram of a circuitry of the pointing device of Figure 2;

Figure 4 illustrates one embodiment of a processing system;

Figure 5 illustrates another embodiment of a processing system; and

Figure 6 illustrates another embodiment of a processing system.

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### Detailed Description of the Invention

In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which the inventions may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that logical, mechanical and electrical changes may be made without departing from the spirit and scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

Referring to Figure 1, a personal digital assistant (PDA) having a touch screen is described. The PDA 100 is designed to be portable and allow a user to store and recall information. The computing device includes a touch screen 102, keypad inputs 104, and optional microphone 106. The touch screen can be controlled using a pointing device, or stylus 110. In one embodiment, the stylus includes a microphone 120 receiving acoustical voice commands which are used to input data and/or control the PDA. It will be appreciated that the personal digital assistant is typically used in a manner which positions the PDA approximately 12 to 18 inches away from a user's mouth. As such, optional microphone 106 is susceptible to background noise. To reduce the effects of background noise, a microphone is provided in the stylus as described in greater detail below. As illustrated in Figure 1, the stylus can be tethered to the PDA via a wire 109 such that the wire is used for wired communication between the stylus and the PDA. This wire is optional, such that in another embodiment the stylus communicates via wireless transmissions. The voice signals received by the stylus are typically translated and displayed on the touch screen. The translated data is stored in the PDA such that the user can retrieve the information and view the stored data. The term "personal digital assistant" is used herein to define any mobile processor intended to store and communicate information for use by a user. This information is typically personal in nature, such as addresses, notes, schedules and the

like. The PDA can include lap top computers with a touch screen. The PDA can also include communication circuitry for bi-directional communication with external devices, such as fax machines, and networked computers. Thus, PDA's are not limited to data storage and display devices.

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5 One embodiment of a pointing stylus is illustrated in Figure 2. Stylus 110 includes a first end 112 having a point, and an opposite end 114 which includes a microphone 120. The stylus is not limited to having a pointed end, the end can be, but is not limited to, round, flat or bulbous. The stylus includes a housing 122 which houses an electronic transmitter circuit. An activation switch 124 is provided to allow a user to selectively activate the microphone and transmitter circuits. The stylus is intended to be hand-held and used in a manner similar to a pen. The stylus, however, is used to selectively touch screen 102 of the personal digital assistant to provide input. It will be appreciated that the stylus allows a user to position the microphone close to their mouth to increase the quality of voice signals, while reducing the effect of background noise.

15 One embodiment of above circuitry provided in stylus 110 is illustrated in the block diagram of Figure 3. The circuitry includes microphone 120, a power source 130, switch 124, and a transmitter circuit 132. The transmitter circuit can be configured to either transmit information to the personal digital assistant through a wire, or transmit voice data via a wireless communications signal. If the wired embodiment is desired, power source 130 can be located in the PDA to reduce circuitry located in the stylus. In the wireless embodiment, however, the power source 130 is preferably a battery stored within the housing of the stylus. Switch 124 is used to activate the microphone and transmitter circuits to allow voice signals to be transmitted to the receiving processor. 20 As such, the switch is typically located along the housing of the stylus such that it is easily activated by a finger of the user. The stylus can be configured to transmit electronic voice signals only while the switch is activated. Alternatively, the stylus can transmit a voice signals in response to a single activation of the switch. In this embodiment, the transmitter of the stylus ends the transmission when input voice 25 signals are not detected for a predefined time period. In yet another embodiment, the 30

switch is used to both activate the transmitter to start voice signal transmissions, and deactivate the transmitter to end transmissions of voice signals.

Referring to Figure 4, different operational embodiments are described of a voice controlled system using the above described stylus. In the first embodiment, the stylus communicates electronic voice signals with a personal computer 200 and directly with PDA 100 via a touch screen. The personal computer (PC) is a home or a business computer intended for stationery use. The personal computer includes a wireless receiver for receiving wireless transmissions from the stylus. Voice signals received by the personal computer are translated into computer recognizable or readable data. While the voice signals received by the personal computer can be used by the personal computer to perform more processing or other operations, it is intended, in the present system, that the personal computer transmits translated voice information to the personal digital assistant 100 via wireless communication. As such, a user operating the personal digital assistant 100 activates touch screen 102 using stylus 110 and speaks into the microphone 120. The voice signals are transmitted from the stylus to personal computer 200 where the voice signals are translated into data. The data is then transmitted from the personal computer to the personal digital assistant. It will be appreciated that the physical distance between the user and the personal computer is limited by the transmission power of the stylus transmitter 132, the PDA and the personal computer. This embodiment allows mobility of the user while maintaining the processing power of the personal computer for voice recognition.

In a second embodiment shown in Figure 5, stylus 110 transmits voice data to personal digital assistant 100. The personal digital assistant transmits the received voice data to personal computer 200. The personal computer then translates the received voice signals into data, and transmits the translated data back to the personal digital assistant. This embodiment allows for a more powerful transmitter to be used between the personal computer and the personal digital assistant, than may be available with transmitter 132. In either the first or second embodiment, when the personal digital assistant is located geographically away from the personal computer such that communication between them is not possible, the personal digital assistant receives

voice data from the stylus and records the voice data for future translation. When the personal digital assistant returns to a location where communication with the personal computer is possible, the recorded voice data is transmitted to the personal computer for translation, and the translated data is transmitted back to the personal digital assistant.

- 5 This option allows a user to use voice commands regardless of location relative to the personal computer. If the user retrieves the voice signals prior to translation, the personal digital assistant will play the stored signals instead of displaying translated data on the screen. Figure 6 illustrates an embodiment where the stylus communicates with the PDA and the PDA performs the speech recognition operations. This
- 10 embodiment allows the stylus to communicate, in either a wireless or wired manner, with the PDA.

- A mobile personal digital assistant has been described which allows a user to enter information using both a touch screen and voice commands. A stylus has been described which includes a microphone positioned at one end, and a transmitter for
- 15 transmitting received voice signals to either a processor or the personal digital assistant. The wireless stylus also includes a power supply and an activation control switch. The processor can be used to translate the voice signals into computer recognizable data which is transmitted to the personal digital assistant for storage and display. If the user and the personal digital assistant are located remotely from the receiving processor,
- 20 voice signals are stored in the personal digital system until a later time when the processor can translate the received voice signals. This application is intended to cover any adaptations or variations of the present invention. For example, the personal digital assistant may be adapted with a processor and software sufficient to translate received voice signals such that the personal computer is not necessary. As such, the stylus
- 25 transmits directly to the PDA and the PDA translates received voice signals.

- Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. Therefore, it is manifestly intended that this invention be limited only by the
- 30 claims and the equivalents thereof.